Acquisition of Surface Analysis Equipment for Research on Metal Diboride Growth and Student Training

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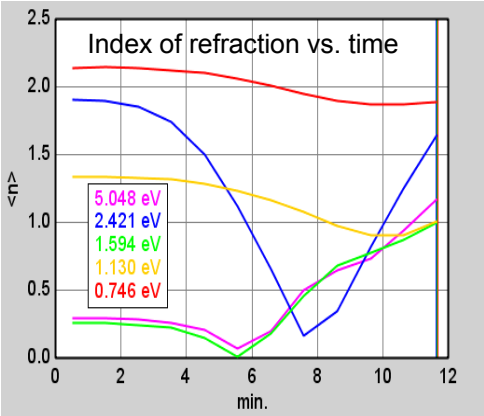

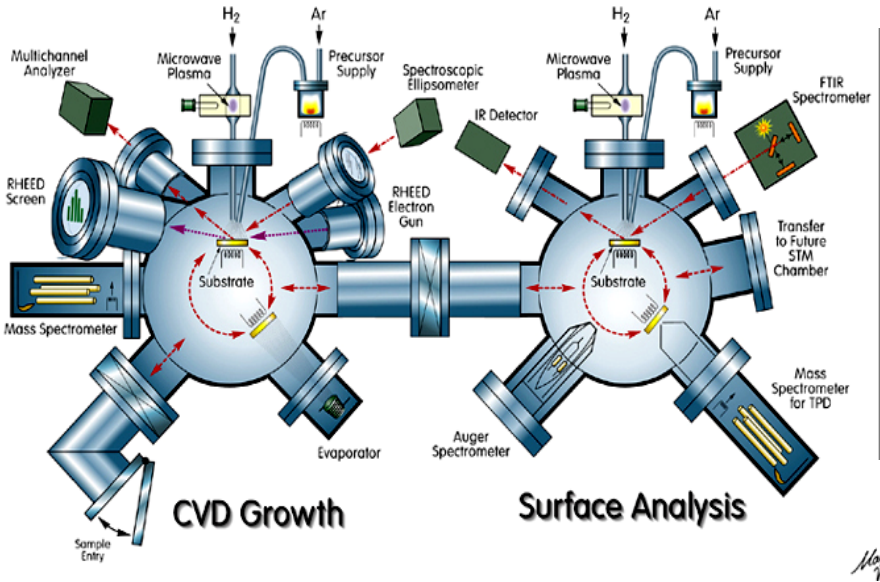

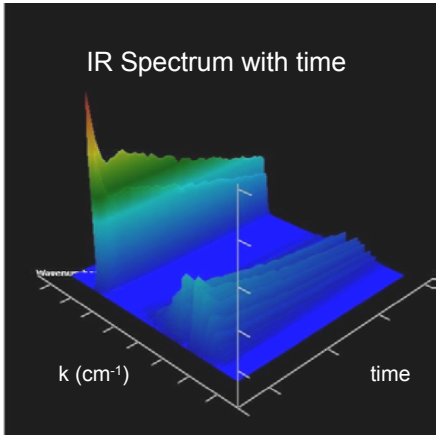

The in-situ instrumentation acquired on this grant provides real-time, atomic-level data on the film formation reactions during the chemical vapor deposition of HfB_2, ZrB_2, and CrB_2 (metallic ceramics) and MgB_2 (a superconductor) using newly-synthesized MB_xH_y precursor molecules at low growth temperatures.

- The **FTIR spectrometer** measures surface adsorbed molecules and fragments via their vibrational modes.
- The **spectroscopic ellipsometer** analyzes the complex optical response, yielding data on thin film nucleation and coalescence, surface roughness, stoichiometry and electrical conductivity.
- The **RHEED system** probes the nucleation, roughness, and crystalline quality of heteroepitaxial films.

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Human resource development during the past year:

- Five graduate student research assistants performed research using the system
- One student graduated with a M.S. degree
- One international undergraduate (from France) completed a summer research project